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ABSTRACT

Potential differences in the learning abilities of adults and children, how they affect learning, and how to maximize adult education effectiveness are explored. The discussion of the differences and changes in the ability to learn covers such changes as those of physical attributes and mental abilities, as well as the role of both the psychological impediments and assets to learning. Several cognitive growth models have been developed and are reviewed: Knox, Houle, Cawley, and Erikson. Adults can learn effectively and progress from stage to appropriate stage if the necessary supports are provided. Educators need to become more aware of the altered learning horizons opened by cognitive development, corresponding to adult development, in order to be effective with all learners. (Author/LS)

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ATTACKING THAT AGING FEELING

Learning and Aging

By
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INTRODUCTION

Mrs. Mary Eldridge is a facinating person. I first stumbled across her unusual nature when I was about 5 years old. Oftentimes when I was small, she would babysit for our family. She was a person full of energy and warmth. She and her husband owned a neat little house on Route 6 which was the main thoroughfare from Providence to Hartford.

The thing that amazed me the most about her was the reputation she had for being a social activist. For many years she had advocated equal rights for women, had headed the Connecticut and Rhode Island Women's Temperance Leaques, had spent many years as a lobbyist at the state legislature, worked twenty-five years as a reporter for a local newspaper, and was active in promoting "gray rights".

She and her husband were the first truly old people I had ever met. Their community involvement and social awareness belied the fact that they were well into their 80's. My concept of aged people was, therefore, rather respectful.

Her husband passed away fifteen years ago but Mary Eldridge's youth and enthusiasm didn't. Five years ago at the age of 97, Mrs. Eldridge decided to go to college. She indicated that she didn't see too much hope for a degree but that she was going to give it a good try. Despite failing eyesight and a hearing problem, she managed to keep up with her younger cohorts and complete her first course successfully.

Recently I learned of her death at the age of 102. She had lived a long, active, useful life. Her determination and joy for life and learning proved that much could be accomplished if a person was willing to

try. She has led the way in our community for other older citizens to return to education without having to face artificial barriers. Mrs. Eldridge proved that older people can learn. She also caused educators to realize that compensations must be made for older people who have physical limitations. Special lighting, more attention to vocal presentation, and a careful outline of learning objectives are a few of the improvements Mrs. Eldridge brought to our community college. She caused educators in the state to consider the special concerns of adult learners.

PURPOSE

The purpose of this study is to answer several questions about the adult learner. First, are there differences in the abilities to learn between adults and children? If there are, what are the differences and how do they affect learning? And finally, what steps can be taken to maximize the effectiveness of Adult education?

In the discussion of the differences and changes in the ability to learn it is necessary to discuss the changes in physical attributes, mental abilities, and the psychological impediments or assets to learning. Of special concern will be the possible growth of cognitive abilities beyond those which have been identified by Piaget. Through the use of Erikson's Epigenetic model, it seems reasonable to assume that intellectual or cognitive growth will have a strong relationship with the developmental tasks.

The Young Learner

vs.

The Old Learner

The score is 4 to 1 with the young learner in the lead. Dr. Malcolm Knowles noted that most research concerning learning has little or no interest in the adult learner. "The fact is that all of the scientific theories of learning have been derived from the study of learning by animals and children."[1] Basically, what it comes down to is that learning has been perceived as an occurrence reserved for the very young and dumb. With the advent of adult education, there has appeared a very real need for more information about the adult learner.

Dr. Paul Bergevin in his book A Philosophy for Adult Education noted several areas of difference between young and old learners. First, adults are more set in their ways and less open to change. Children, by the very nature of their youth, have not had the experiences which have a tendency to channel a person's responses. The adult's personality is more firmly established which may also prevent or limit certain intellectual responses. Quite often, older people have established stereotypic concepts about themselves and others which limit their adaptibility.

Second, Adults usually have emotional ties with certain words, situations, ideas, institutions, and items which could easily color their perceptions. Children have not been exposed to the ramifications of many

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1. Malcolm Knowles, The Adult Learner: A Neglected Species, Gulf Publishing Company (Houston, Texas 1973) page 12.

concepts and have less to color their vision. Third, adults may have strong antiauthority beliefs which, in dealing with the autocratic teaching method, may interfere. Another impediment to learning would be the inability of some adults to deal with the threat of failure, especially since learning is a child's task. Learning might also serve to upset the balance a person has built. Previous concepts may become nudged aside by new knowledge which could shake some of the person's sacred cows. It is difficult for a person to alter long-held attitudes.[2]

Some of the obvious differences of adults and children in the learning situation are the biological ones. Physiologically, children may find it easier to learn. There may be changes in the way adults perceive their environment due to their personality solidification and other attributes of experience. Another change may occur in the way adults encounter learning. If the older student is approaching the material from a different cognitive position, the ease and method of learning will be different. The adult learner may see more interconnections for the material learned due to past experience.

Bergevin states that the primary lack of adults is their lack of self-discipline. A child can be coerced into performing in an orderly, time blocked manner. Older people usually don't have the submissive nature nor the excess time which can be neatly programmed for them.[3] Adults lack

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2. Paul Bergevin, A Philosophy for Adult Education, The Seabury Press (New York, N.Y. 1967) page 122.

3. Paul Bergevin, page 116.

the self-discipline necessary and are in a state of life when it is difficult to impose order on them. However, despite this limitation, there is agreement that "...the adult is able to learn and grow and change as long as he is alive."[4] The person may experience some change in the ability to learn but "...it is not enough to deter anybody who really wants to learn."[5]

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4. Paul Bergevin, page 120.

5. Paul Bergevin, page 117.

Physiological Change

Lugo and Hershey stated that there was little decline "...in physical ability to function adequately between youth and even age 65 (or older) if the body is not affected by disease or allowed to deteriorate."[6] The word of importance here is "adequately". The level of peak performance is affected by the process of aging. Certain abilities are lost or diminished due to the physiological changes that occur during adulthood.

Brumley in The Psychology of Human Ageing developed a comparison of the different age groups in relation to the process of physical aging. She said:

> "Changes during adult life are less spectagular but they are nevertheless progressive and cumulative. Biological changes up to the end of adolescence provide a natural basis for understanding social and psychological aspects of development. During adult life, however, biological changes are less rapid and less consistent, and their effects upon performance and social adjustment are less clear. In late maturity and old age (senescence), biological changes again become impressive and bring about progressive, systematic and cumulative adverse changes in the physical basis of behaviour, and, therefore, in the psychological and social characteristices of old people."[7]

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6. James O..Lugo and Gerald L. Hershey, Human Development, Macmillan Publishing Company (New York 1974) page 515.

7. D. E. Brumley, Psychology of Human Ageing, Penguin Books Ltd., (Harmondsworth, Middlesex, England 1966) page 22.

The gradual changes in adulthood cause a change in the way the adult perceives the learning environment. There are no single, bold physical alterations so that the person may adjust to the changes without realizing that a change has occurred. As the cumulative effects become more noticeable in old age, the adjustments necessary for learning become more difficult if no considerations are made for the lessened physiological capacity.

Biological Blocks. There are specific biological abilities that diminish with age. Visual powers begin to fade after age 5 in that the ability to shorten the focal distance of the lens becomes more difficult. The ability to focus (through focal shortening) shows a continual decline until approximately age 60.[8] In ralation to this, aging also effects the speed of contraction of the pupils. The older person needs more light to see as well as before. Color differentiation and contrast discrimination show a decline as the person ages.[9]

Hearing reaches its peak accuity at ages 12-15. There are regular small losses in hearing until about age 25 when males begin to show a disproportionate loss at the upper frequencies. Females show a similar loss at the lower frequencies. By age 45, males show a minimum loss of 10 db. in the upper frequencies and by age 70, a 10 db. loss at all frequencies.[10] At age 55 there are many more men suffering deafness

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8. Huey B. Long and Curtis Ulmer, The Physiology of Aging: Prentice-Hall, Inc. (Englewood Cliffs, N.J. 1972) page 16.

9. Huey B. Long and Curtis Ulmer, page 17, 18, and 19.

10. Huey B. Long and Curtis Ulmer, page 18.

than females. Also, during this period, there is a continual loss of pitch discrimination.[11] It takes the older person a longer time to discriminate what has been said due to these hearing changes.[12]

Muscular, skeletal, and tissue changes occur as a person ages which may alter the person's ability to do many tasks which were previously easy. Muscles become more striated with fat as the person ages and there is a similar loss of strength.[13] The body finds it more difficult to adjust to changes such as temperature. There is a hardening and reduced elasticity of the laryngeal cartilages by age 40. This causes a loss in the ability to speak and sing in public with power.[14] Some studies indicated that there was a slowing of the speech patterns with longer pauses becoming prevalent.[15]

Recent Findings. There exist physiological alterations in the brain which may affect the learning process. As the person ages, the brain decreases in size. Although there are no demonstrated effects, it is conjectured that the shrinkage may explain some behavioral differences and that it might interfere with other anatomical changes.[16]

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11. Huey B. Long and Curtis Ulmer, page 19.

12. Alfred D. Weiss, "Sensory Functions", as quoted by Huey B. Long and Curtis Ulmer, The Physiology of Aging: How It Affects Learning, Prentice-Hall Inc. (New Jersey 1972) page 19.

13. Huey B. Long and Curtis Ulmer, pages 28-29.

14. D. B. Brumley, page 50.

15. D. B. Brumley, page 51.

16. Huey B. Long and Curtis Ulmer, page 24.

Destruction of brain cells results in no regeneration, but, neighboring pathways usually take over the functions of the lost pathways (sometimes more effectively than the original).[17]

EEG records of older people show the same patterns as those of younger people,[18] however, 40% of all people admitted to mental institutions are over 60. Reasons given for this high incidence are: poor physical health, enforced idleness, economic stress, lack of social intercourse, and similar social, psychological, and environmental pressures.[19] The truth may be that the families of the older people have found it too difficult to cope with the little understood effects of aging. Rather than make adjustments, the old people are institutionalized.

The synapes or passage ways become stronger the more they are used, therefore, as a person ages the network of neurons becomes more developed and more firmly established. This may help explain the difficulty that adults have in developing new concepts as the well-established synapes are easier to follow.[20]

As people age there is sometimes a need for more antibiotics to combat disease. Interestingly, it has been found that the change of short term memory to long term memory is affected and slowed by the use of antibiotics.[21] This finding should have ramifications in all areas of learning.

Recently it was discovered that the more REM (rapid eye movement)

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17. D.O. Hebb as quoted by Irving S. Bengelsdorf, "The Role of the Brain and Nervous System in Learning and Memory", The Education Digest Vol.XLI No.4, Dec. 1975 page 22.

18. D.B. Brumley, page 55.

19. Huey B. Long and Ulmer Curtis, page 31.

20. D.O. Hebb as quoted by Irving S. Bengelsdorf, page 22.

21. Irving S. Bengelsdorf, page 22.

sleep a person gets, the greater the permanence of learning. Memory is also enhanced by the amount of REM sleep a person gets.[22] In relation to adults, Brezinova reported that adults at an average age of 55 have less deep sleep and shorter periods of REM sleep.[23] These findings seem to indicate that the older adult is at a disadvantage in learning and memory due to the lessening of REM sleep. Further studies should be done to ascertain Bengelsdorf's and Brezinova's findings and this information should be utilized to help make learning more effective for adults.

Inspite of the biological and physiological effects of aging, adults have shown that many of them are capable of effective learning. [illegible] identified five types of adjustment that indicate the amount of success in learning a person will realize:

1. Adjustment to the new situation may fail completely so that the person is not capable of learning.
2. The adjustment made may be a partial success so that the adult achieves some learning.
3. Efficiency of the adjustment may allow the learning ability or skill to remain at the same level.
4. No loss occurs despite biological decline because the operation is still within the physical or mental capabilities of the person.
5. The adult may overcompensate and show an increased ability.[24]

Whatever the results, adults, for the most part, are able to compensate to some degree for their lost physical abilities.

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22. Irving S. Bengelsdorf, page 21.

23. Vlasta Brezinova as summarized in Psychological Abstracts, Vol. 55 No. 1 (January 1976) 350.

24. D.B. Brumley, pages 166-167.

Mental Changes in Aging

As the adult ages, there are mental alterations that may effect the ability of the person. The most widely discussed aspect is intellectual loss. Much of the research on the effects of aging on intelligence has been conducted using cross-sectional studies. It has been assumed that the differences in intelligence are due to the effects of aging (whereas historical reference might be a truer index). James Patterson in "Frontiers in the Education of the Elderly" countered this when he wrote:

> "...age has nothing to do with intellectual acuity. Botwinik, Woodruff, Schaie and Birren have all proved that there is no significant intellectual loss for most persons as they age. Our store of information and our vocabularies can grow until we die. This research effectively destroys the myth that older persons have no capacity for continued mental growth or social contributions."[25]

It is obvious, from Patterson's remarks, that there is a growing interest in the nature of adult intelligence. Researchers have begun to realize that many factors come into play when measurements of intelligence are related to age.

Recent Aging Research. It is necessary to present some of the present data on aging. It may not be universal, but it is useful information to apply to the present crop of older learners.

Denney and Denney wrote that there were differences in the responses of middle-age (38) subjects and elderly(82) subjects who were

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25. James A. Patterson, "Frontiers in the Education of the Elderly", Adult Leadership (Vol. 24 No. 5, 1976) page 170.

in a nursing home on a projective test. They found that the middle age subjects asked questions about an ambiguous picture that tended to narrow the possibilities. Elderly subjects asked more questions but did not narrow the possibilities and were very hesitant about guessing. Their conclusion was that "...there is a decline in the use of classification for problem solving among the elderly."[26]

The ability of serendipity (finding what you're not looking for) seems to decline with age possibly because "...the older person's conceptual system (of ideas) is not as open or flexible as it used to be."[27] Following this idea is the findings that age effects both intentional and nonintentional learning.[28] Well-defined neural pathways appear to interfere with the acquisition of new information. The rate of innovation and discovery declines with age with the maximum production being at ages 30-35. Brumley went on to explain, however, that creativity is not limited to this age group but that achievement is at its maximum at this time.[29]

The most often reported difference in older adults is the slowdown in their response time. Anders and Fozard wrote that the speed of primary and secondary memories slowed with age. Young subjects (21 yrs.) demonstrated a primal memory search which was twice

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26. Douglas R. Denney and Nancy W. Denney, "The Use of Classification for Problem Solving: A Comparison of Middle and Old Age", Developmental Psychology (Vol.9 No.2, Oct. 1973)pp. 277.

27. D.B. Brumley, page 168.

28. D.B. Brumley, page 168.

29. D.B. Brumley, page 260.

as fast as the older group (56 yrs). The secondary memory search showed no significant difference. The older subjects did show a better ability to retrieve secondary memories over primary memories.[30] Lorge, speaking on this point, said that the distinction between the rate of response and the power of the response was noteworthy. He indicated that, whereas the speed of response may slow down, there may be as much or more insight in the response.[31] It follows that intelligence tests that require speed of response may not take into account the real ability of the subject. Biological factors which slow the ability to respond immediately have not been given proper attention.

The storage and processing of information seems to be effected by aging (at least in a cross-sectional, historical view). The person may no longer be able to go at a fast pace, may need to subdivide and use mental tools. The limits of short term memory and organizational ability may demand either compensation or failure. Brumley recognized this when she wrote:

> "Older persons can be compared with computers in which some components have become unreliable or have failed altogether. Such computers continue to function, in a limited way, if the problems are not too complicated or if longer (more 'roundabout') programming is possible."[32]

What seems to be missing in this analysis is that the losses supposedly

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30. Terry R. Anders and James L. Fozard, "Effects of Age Upon Retrieval from Primary and Secondary Memory" Developmental Psychology (Vol.9 No.3 Nov. 1973) pages 411-415.

31. I. Lorge as quoted by Malcolm Knowles, page 152.

32. D.B. Brumley, pages 158-159.

suffered in cognitive functioning may actually be failures in the input mechanisms (especially sight and hearing). A perfectly capable computer will not function at its optimum if there are problems in interpreting the input. If an experimenter "...speeds up the conversation, lowers the intensity of the speech or increases the complexity of the information, changes occur in the older person's performance."[33] The same results could be activated in a computer by introducing interference to the operations. Biological changes in healthy older people may act as interference rather than creating inability.

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33. D.B. Brumley, pages 158-159.

Cognitive Changes

There appear to be developmental stages of cognition that follow the stages of adult development. Alan Knox in The Audience for Liberal Adult Education wrote that there were tie-ins between what a person wanted to learn, how he learned it, and the developmental task the person was going through. The young adult's initial choice is the type of cognitive style they are going to pursue, Knox identified the choice as being either vocationally involved or leaning toward the liberal arts.[34] Houle broke this categorization into three styles: Goal-Oriented Learning, Activity-Oriented Learning, and Learning-Oriented.[35] Cawley et al. described the choice as being between the analytic and global-relational.[36]

Vocational and Liberal Arts Cognitive Style. Knox's vocational bent was described as the need for the person to attain status through vocational success. The young adult during this developmental stage devotes a major portion of his time or energy to this task to the neglect of the family. The liberal bent person sees his/her occupation as being minimumly demanding and looks elsewhere for intellectual stimulation. For the most part, however, a person grows from the singleminded interest in the job and family to an increasing interest in civic and social responsibility, relations with both younger and older generations, and leisure time

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34. Alan B. Knox, The Audience for Liberal Arts Education, Center for the Study of Liberal Education for Adults (Chicago, Ill. 1962) pages 31-32.

35. Houle as quoted by Malcolm Knowles, pages 35-36.

36. Richard Cawley, et al. "Cognitive Styles and the Adult Learner" Adult Education (Vol.XXVI No.2, Winter 1976) page 103.

activities suitable for the established adult.[37] Social responsibilities grow as the vocational needs decline leading the person into possibly re-evaluating their positions. The goal orientation of the early adulthood phase has evolved into a more social orientation. The person may become an activity-oriented learner who is beginning to search for social contacts beyond the immediate family sphere. Vocational pursuit may give way to the pursuit of liberal arts. In reaching for this new life style, the person will probably experience a need to approach situations differently.

Analytic and Global-Relational Cognitive Style. Cawley et al. saw two cognitive styles. The analytic method entailed extracting information from a stimulus or situation. "Learning has a stimulus-centered orientation and is parts-specific, that is, the parts or attributes of a given stimulus have meaning in themselves."[38] This style is associated with a longer attention span, nonsocialness, enjoyment of complexity, preference for formal learning, and a more sedentary life.[39]

The second method was the global-relational. In this type of cognitive style, there is a need for functional abstraction. The stimulus is only important in relation to the total context. Global orientation does not demand a long attention span, there is a tendency toward hypokinesis, (lacking reaction to stimulae), preference for informal learning, more social integration, and less of an achievement need.[40]

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37. Alan B. Knox, pages 31-32.
38. Richard Cawley et al., page 103.
39. Richard Cawley et al., page 103.
40. Richard Cawley et al., page 103.

Cognitive Style and Erikson's Epigenetic Model. As the adult ages, new needs develop or there are further elaborations on old themes (i.e. Erikson's Epigenetic Model). Cawley's analytic and global styles appear as established life patterns whereas the actual cognitive style is probably more flexible. The impetus in early adulthood is toward the establishment of the family and vocational success. It seems reasonable to assume that the person pursues these goals in a way that is conducive to their achievement (although everyone is not capable of doing this). The cognitive style utilized would center on attaining the necessary skills in a goal-oriented manner. It would be similar to Houle's goal-orientation which he says does not start until the mid twenties. It would also be tied with Cawley's analytic style because of the need to focus on one stimulus (goal) and its nonsocial emphasis. It is apparent that the straight analytic style is too extreme and not in line with the actual nature.

As the person matures and begins to emerge from the career thrust of the early years, he begins to see a need for social expansion. The growth of the social personality is often spurred by crisis or need. As problems become more pressing, and do not lend themselves to solving by previous means, the adult may feel a need for greater involvement in exterior groups.[41] Conversely, it may be a period when the person has taken the time to re-evaluate priorities and has decided that social responsibility is the next stage of growth for him or her. It would be similar to Erikson's generativity stage tied with maturity where the adult moves from self-centered orientation of job and family to the need to make

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41. Houle as quoted by Malcolm Knowles, page 36.

contributions to the community.

This stage of development could utilize many of the attributes of the global-relational method. There is more of a demand for nonspecific attainments (less of a goal orientation). There appears to be a move toward humanistic ideas. The person might take on a liberal arts bent. The cognitive style would reflect the broadened horizons of the person.

Similar to Erikson's Epigenetic Model, it is possible that a person could become caught in one stage and would not be able to progress to the next development. A person could easily become embroiled in the self-centered stage and would not be able to develop any (or very little) social responsibility. The way a person approached learning would depend in part on the developmental stage of the person's cognitive style or method.

Cognitive Steps

The cognitive style (or perhaps more descriptively, the cognitive personality) is the manner in which a person deals with developmental problems. This differs from the cognitive steps. As a person passes through life, growth occurs in the ability to perceive. Piaget first noted this in children and developed steps of cognition starting with the preoperational stage and ending with the problem-solving stage. Robert Gagne in The Conditions of Learning (1965) went into further detail and described eight steps of learning in a hierarcial pattern:

1. signal learning- make a general, diffuse response as in classical conditioning.
2. stimulus-response - a precise response to certain stimulus.
3. chaining - an interconnection of two or more stimulus-response connections.
4. verbal association - learning of chains that are verbal.
5. multiple discrimination - the ability to make as many responses as there are different stimuli.
6. concept learning - acquire the capability of making a common response to a class of stimuli that may outwardly appear different but are in fact related.
7. principle learning - a chain of two or more concepts.
8. problem solving - two or more acquired principles are combined to produce a new capability.[42]

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42. Robert Gagne as quoted by Malcolm Knowles, page 57.

Gagne's listing indicates a pattern of growth, not specifically tied to any age groups, but very similar to Piaget's steps.

Affective Elements of Cognitive Steps. According to Knowles, cognitive theorists such as Piaget and Bruner are "...unbalanced in their overemphasis on cognitive skills at the expense of emotional development; that they are preoccupied with the aggressive, agentic, and autonomous motives to the exclusion of the homonymous, libidinal, and communal motives; and that they concern themselves with concept attainment to the exclusion of concept formation or invention."[43] In essense, they have ignored the effects of the personality on the cognitive steps. In partial answer to Knowles statement, it has to be noted that both Gagne and Piaget attempted to demonstrate a progression or growth in cognitive ability. They did fail, however, to account for accompanying affective factors in any great detail. By ignoring the emotional impact they were able to avoid the cognitive characterization that Crowder, Knox, and Houle became involved with.

The total absence of affective development in cognitive theory limits the cognitive steps unfairly. There appear to be refinements to the cognitive steps which are precluded unless the emotive nature is included. To use a crude analogy, Piaget and Gagne have pointed cognition toward the target but haven't found the bullseye yet. Emotional development may be the finer calibration.

Generativity, Creativity, and Cognitive Growth. Patricia Kennedy Arlin identified a fifth step of cognitive growth. She noted the development

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43. Malcolm Knowles, page 28.

of the problem finding step by certain people.[44] Arlen stated that after problems are explained through the abstract process it is possible that new problems could be generated by the constructs. In relation to Gagne's model, the problem-finding step would be the utilization of newly discovered capabilities to discover other problems. Interestingly, this period of search seems to relate with Erikson's generativity attribute of the adult stage. This step would also seem to apply to the cognitive character that was developed earlier. A move is made from meeting needs to satisfying needs through helping others. The person achieves a global-relational attitude.

In relation to this, Brumley noted that the rate of creative achievement was highest during the 30-35 year range.[45] It is at this point that the person has served the initial apprenticeship and is ready to reach for generative development.

Assuming that a person does become more generative in the adult stage, then it is possible that the person will face the conflict of ego integrity versus despair. Ego integrity would probably be demonstrated by a mature acceptance of the past. The person would perceive the positive changes of his life and begin to emotionally mellow. The generativity of the earlier period may still exist but the psychological need to generate will probably lessen. With the decrease in physiological abilities, the person becomes less of a prime agent of change and more of a facilitator.

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44. Patricia Kennedy Arlin, "Cognitive Development in Adulthood: A Fifth Stage?", Developmental Psychology (Vol.II No.5, Sept.1975) page 604.

45. D.B. Brumley, page 260.

Lehman's creativity studies (1953) showed that high-quality output was greatest during the thirties such that 80% of the significant work was completed by age 50.[46] Different fields showed different creativity periods but it is interesting to note that the main thrust of creativity occurs in the generative stage. Lehman's figures are, however, of questionable importance. Simple math shows that with an average life span of 70 years, over 80% of life occurs prior to age 50.

During the ego integrity period the person has reached a point where accumulated knowledge is at its peak. Experience in the profession or field may give the person a better overall view of the specialty, but, at the same time, much of the freshness of perspective of the inexperienced is lost.[47] It is during this period that the person may find it easier to help others reach out than it would be for him or her to reach out. The need to prove one's worth has been replaced by a realization of self (or rejection of self). The need to generate questions has diminished and has been replaced with a desire to assist others discover their questions.

Gruber viewed the growth beyond Piaget's formal stage as the stage of wisdom.[48] The combination of the mature emotions (possibly the ego identity stage) and the cognitive abilities of the person yield the next step in the adult development of cognition.

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46. Lehman as paraphrased by Douglas C. Kimmel, Adulthood and Aging John Wiley & Sons, Inc. (New York 1974) page 383.

47. Douglas C. Kimmel, pages 385-386.

48. Gruber as paraphrased by Patricia Kennedy Arlin, page 602.

Summary of Cognitive Changes. It is possible to identify cognitive personalities (styles) and cognitive steps. The problem is that there has been little research to completely identify either of these areas. The cognitive personality (style) is produced by altering attitudes, values, and perceptions. Cognitive stages or steps are produced by the successful negotiation of cognitive personalities combined with the realization of the development of the intellect in adulthood. With further research, it may be possible to add two more steps to cognition. The stage of problem searching may prove to be an attribute of the adult stage of ages 30-47 as identified by Erikson. The years of maturity and old age may be seen as the years of the combination of a stable emotional perspective and cognitive growth to form the wisdom stage.

Psychological Effects

Biological Change and Psychological Effects. The psychological effects of aging cause changes in the ability of the person to cope with learning. Body changes often cause the adult to re-evaluate his/her abilities. The aspects of loss of stature, increase of weight, loss or thinning of hair, skin and complexion alterations, increased wrinkles, diminished size of muscles, loss of visual acuity, loss of hearing, and dental problems can have psychological effects that interfere with learning.[49] Robert Peck noted that adults who were able to modify their self-concept as they grew older were mentally healthier. Peck stated that a shift from valuing physical power to valuing wisdom should ideally occur in the critical period of the late 30's and 40's (quite similar to the shift toward ego integrity of Erikson and Gruber's wisdom stage).[50]

Due to the alterations, the person loses confidence in his or her abilities. Adults are bombarded with cultural beliefs such as 'an old dog can't learn new tricks.' In reality they probably have a wealth of experience that would make learning a lot easier.[51] Many adults have learned to compensate for their inabilities so successfully that the adult educator would likely miss the true difficulty.[52]

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49. Huey Long and Curtis Ulmer, pages 39-40.

50. Robert Peck as paraphrased by Huey Long and Curtis Ulmer, p.38.

51. George H. McNinch (ed) Questions and Answers in Adult Education, SREB, Univ. of So. Miss. (Hattiesburg 1966) page 26.

52. George H. McNinch, page 26.

Psychological Change and Learning. Projective tests have shown a lessening of the achievement need for men. There appears to be a greater tendency toward inactivity, submission and introspection.[53] This period holds a great deal of importance in adult learning. If the person is re-examining values, then it is possible that there might be a rekindling of interest in learning. Some courses which deal with some of the problems the adult is facing would be of benefit. Adults are voluntary students and course offerings for adults should be focused on the needs of the adult.[54]

Blocks to formal learning are fairly prevalent. Knowles mentioned that adults experience many psychological blocks upon re-entering a formal educational setting. The adult often feels a loss of respect basically due to culture's belief that education is for children. Remembrances of past learning experiences may be painful and cause the person to avoid the situation. Learning itself could be perceived as a threat. New ideas could challenge many of the person's values or beliefs. Many adults aren't prepared for self-directed learning. It is not an American custom for a person fo freely choose courses and then plan one's time to accomplish the choices. Physical facilities such as school buildings, blackboards, and desks may raise fears that defeat the atmosphere necessary for learning.[55] Most of the differences between the learning of children and adults center around these psychological blocks (and those mentioned earlier).

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53. D.B. Brumlev, page 99.

54. George H. McNinch, page 25.

55. Malcolm Knowles, The Modern Practice of Adult Education: Andragogy Versus Pedagogy, Associated Press (New York 1970) p.40.

Attitudes that Affect Learning. There are other attitudes that effectively limit the adult's ability to learn. First, the adult must meet and overcome the Role and Self Concept Theory. This is the situation where the society and the adult view the person as a nonlearner. Learning is perceived as a child's task and that learning is not a worthwhile pursuit for an adult.[56]

The next obstacle is the Sense of Discovery Theory. It seems that the awe that accompanies discovery is lost in the adult years. If this were reestablished, the adult would probably increase intellectual functioning. As the strange becomes common, actions become more habitual. People tend to follow the path of least resistance and become rutted. Naivete may help make learning more interesting and more vital.[57]

Similar to the previously mentioned cognitive style and step attainment is the Critical Periods Theory. These periods originate or end in significant events. Major milestones such as the birth of a child, employment, loss of abilities, and retirement may cause a 'choice point' in life direction necessitating an agonizing reappraisal. Significant learning seems to occur at such critical points.[58]

Another concept which must be dealt with is the Theory of Commitment. As a person ages, it is common for them to develop more commitments. As a young person they start out with tentative commitments (such as dating) and as they age they begin to take on permanent commitments (marriage/?). These commitments often serve to block learning. The

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56. Malcolm Knowles, page 154.

57. Malcolm Knowles, pages 154-155.

58. H.Y. McClusky as quoted by Malcolm Knowles, page 147.

need to support a family may outweigh the person's desire for more education.[59]

A final idea is the Time Perception Theory. As the adult ages the view he/she holds is altered "...at about 30 the young adult begins to realize that time is not unlimited and that as time passes his range of options with respect to job, family and other areas of living are becoming correspondingly reduced."[60] The adult starts to think of how many years are left and may feel a need to either retrench or expand. By age 50 there may be doubts about one's ability to learn.[61]

The meeting of these psychological trouble areas cannot be left to chance. Educators interested in the education of adults have to be aware of the psychological impediments to learning and strive to make their programs meaningful and accessible for adults. Some thoughts as to how this can be accomplished will be discussed in the next section.

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59. H.Y. McClusky as quoted by Malcolm Knowles, page 147.

60. H.Y. McClusky as quoted by Malcolm Knowles, page 149.

61. H.Y. McClusky as quoted by Malcolm Knowles, page 149.

Ways To Improve Adult Learning

It has been observed that the synapses of the brain seem to become stonger the more they are used.[62] From this, it can be projected that the adult who is actively involved in learning will strengthen the pathways for future learning. The problem is that most adults do not maintain or utilize the learning patterns. Many never participate in a formal learning situation after they leave high school or college. Many of the psychological blocks come into play to limit participation in learning activities by adults.

Improving the Likelihood for Success. If we are lucky enough to discover adults who are interested in participating in formal learning, then everything that can be done to improve the likelihood of success for the adult learner should be done. To combat the effects of aging, Long and Ulmer offered several suggestions:

1. Provide more light to help the adult to clearly see the materials without undue strain.
2. Use a greater, more clear volume to combat hearing losses.
3. Present information more slowly because of the reduced information channel capacity.
4. Provide more time for relearning and use a variety of presentations.
5. Take into account the lower energy level of adults and pace instruction accordingly.
6. Despite the adult's high tolerance for pain, the environment should be as comfortable as possible.
7. Equipment and supplies should correspond to the physiological changes (i.e. non-glare paper, special writing equipment, chalkboards).

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62. D.O. Hebb as paraphrased by Irving S. Bengelsdorf, page 22.

8. Recognize the greater caution and sensorimotor coordination difficulties in adults. The reduced rate response should be permitted.

9. Note should be paid to the adult's decreased sensorimotor coordination and time should be allotted for extra practice in the different skills.[63]

Basically, their suggestions center around making it easier for the adult learner to succeed. Constant failure due to physiological changes will quickly turn the adult away from learning. Adult Education should maintain a positive learning environment.

Sam Hand offered several other items that should be considered.[64] First, after meeting the physical comforts of the adult, the learning time and place should be fitted to the adult's needs. Too often programs ignore the probable reduced mobility and time desires of older people. Classes are still designed with the building and the instructor in mind and not the student. People who work different times are seldom included in the educational system. The complexities of swing shifts are more often ignored than dealt with.

Second, the adult student should be permitted to choose his or her own tempo. For the most part, adults who have recently returned to school need both direction and encouragement. As the person's self assurance increases, there is an increase in the person's belief in his/her own ability to learn. The adjustment is greatly facilitated if the person is able to set his or her own pace.

Third, the classroom atmosphere should be socially pleasant. Every effort should be made to reduce the anxiety of the people and this

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63. Huey Long and Curtis Ulmer, page 44.

64. Sam Hand as paraphased by Huey Long and Curtis Ulmer, page 44.

might be accomplished if some of the formal aspects of the course were made more flexible. The objectives should be clearly outlined as should the means of obtaining the objectives. Care should be taken to see that the class meetings do not go overtime and impinge on the person's time.

Learning should be a progression, simple activities toward more difficult activities. "A graded series of problems, starting from the most elementary actions and relations, will probably result in a greater willingness among older people to attempt tasks which they would otherwise refuse."[65] A gradual building of competency at the person's own speed would assist learning. All means of communication should be utilized so that the adult will have a better chance of receiving undistorted information.

Provisions should be made so that the adult can practice the new skills as he/she goes along. Hands-on training should be the rule and not the exception. An active participant rather than a passive listener will usually learn better.

Care should be taken in the early stages of learning to assure the person success without being obtrusive. The process should follow simple yet important steps slowly building toward complexity. The connection between the learned rule and the actual usage should be kept direct. Memorization for the sake of memorization should be avoided. Tentative research has shown that aging affects short-term memory. It is difficult to remember insignificant ideas so it would be better if time was spent on important items.

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65. D.B. Brumley, page 200.

All items in the presentation (of course) should tie together to form a total picture or build a competent performance. Each learned step must occupy a firm position in the overall learning. And, to tie all these attributes together effectively, the person must be given a continuing evaluation as he/she goes along. The adult should feel a sense of progress and achievement.[66]

Affective Elements. What really needs to be expressed is that learning is an attitude. The adult brings many preconceptions to the learning situation. Some of these are limiting factors which may prevent educational growth. The instructor has to be aware of these limiting factors (psychological blocks) and be willing to try and lessen their hold. Learning should be a growing, wonderous journey and not a nightmare of past experiences.

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66. D.B. Brumley, page 174.

Conclusions

Aging does effect the learning of adults. Physiological, psychological, and sociological influences interact throughout a person's life to constantly alter the ability to cope with learning. Yet, most adults do not lose the capability to be successful learners. There appear to be developmental stages for both the cognitive personality and the cognitive step or stage of the adult. Too little emphasis has been placed on the cognitive growth of older individuals.

Although Erikson's Epigenetic Model may be too broad in its age groupings (especially in light of the extended periods of education and the present economic situation where people cannot afford to be altruistic) it does seem to present a fairly accurate outline of the adult circumstance. Cognitive development shows a correspondence with adult development. Educators should be more aware of the altered learning horizons opened by cognitive development in order to be effective with all learners.

The data show that adults can learn effectively if the necessary support is given. The adult who uses the learning pathways develops a life concerned with growth. As Ilya Ehrenburg said: "One must go on learning as long as there is breath in ones body, and a student's bench becomes the old man better than the preacher's pulpit or the academician's chair."[67] The person who wants to maintain what he or she has, had better use it. Learning can be a lifelong experience if educators, students, and society are willing to give it a chance. The time has passed when we can afford to waste the resources of our older citizens.

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67. Ilya Ehrenburg as quoted by Ronal G. Poland, Human Experience: A Psychology of Growth, C.V. Mosby (St. Louis 1974) page 101.

APPENDIX

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